

The Corp's Role in Riparian Restoration and Management

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What are Riparian Zones?





U.S. Army Corps of Engineers

(33 CFR:1984)

"Jurisdictional wetlands"

“Those areas that are inundated or saturated by *surface or ground water* at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of *vegetation* typically adapted for life in *saturated soil* conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

Riparian Definitions

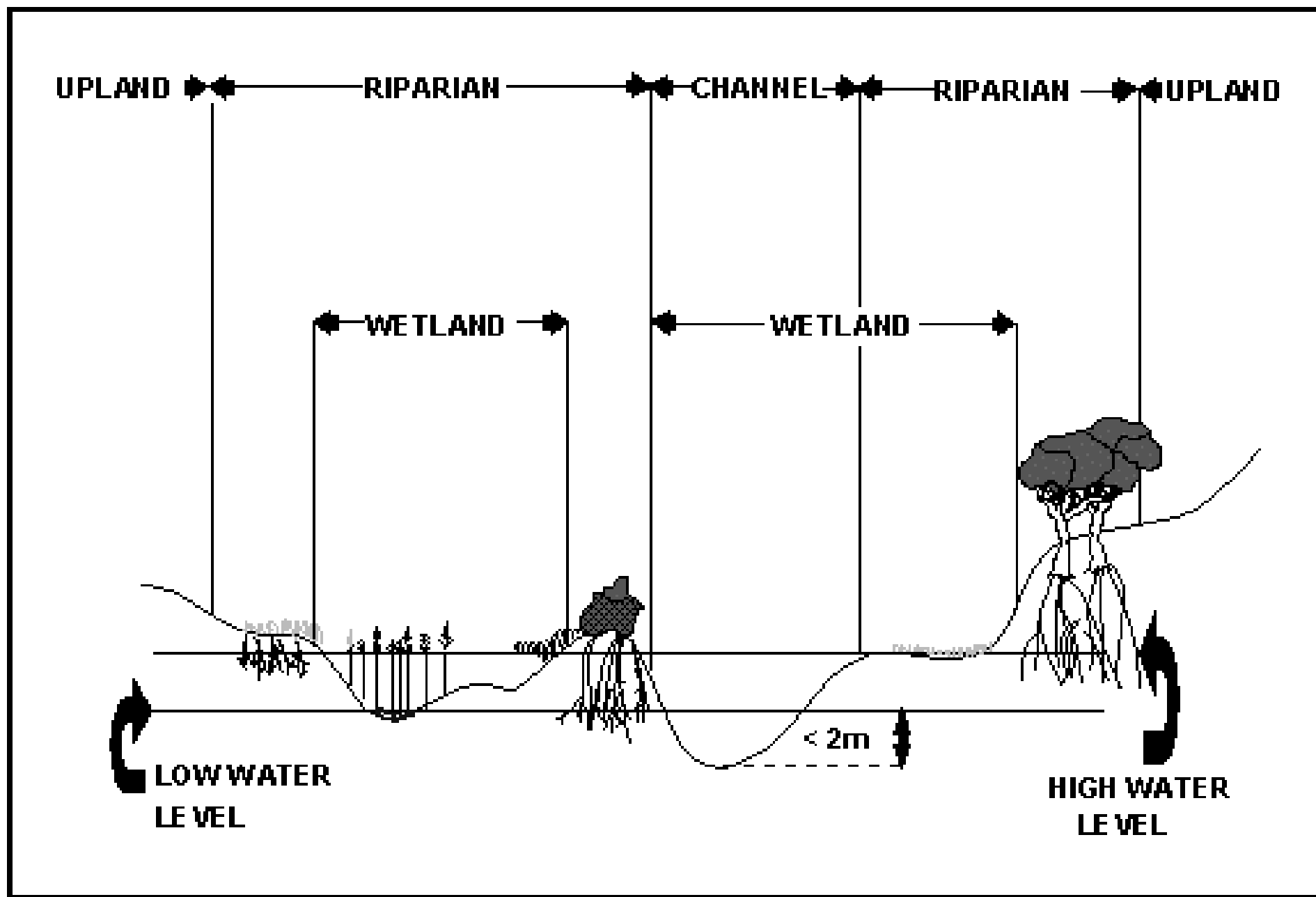
**“associated with water courses. Riparian may refer to vegetation associated with large rivers or with small, even intermittent drainages such as arroyos.”--
Dick Peddie and Hubbard (1977)**

**“Riparian areas are three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems, that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at a variable width”
-- Ilhardt et al. (2000)**

**“a distinct ecological site, or combination of sites, in which soil moisture is sufficiently in excess of that otherwise available locally, due to *run-off* and/or subsurface seepage, so as to result in an existing or potential soil-*vegetation* complex that depicts the influence of that extra *soil moisture*.”
-- Anderson (1987)**

**“environs of freshwater bodies, watercourses, and surface-emergent aquifers (springs, seeps, and oases) whose *transported waters* provide *soil moisture* in excess of that otherwise available through local precipitation to potentially support the growth of mesic *vegetation*.”
--Warner and Hendrix (1984)**

**“Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect waterbodies with their adjacent uplands. They include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e., a zone of influence). Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines.”
-- National Research Council (2002)**



“Riparian areas generally do not satisfy regulatory and other definitions of “wetland,” and thus are not encompassed by regulatory programs for wetland protection.”

National Research Council, 2002











Benefits and Functions

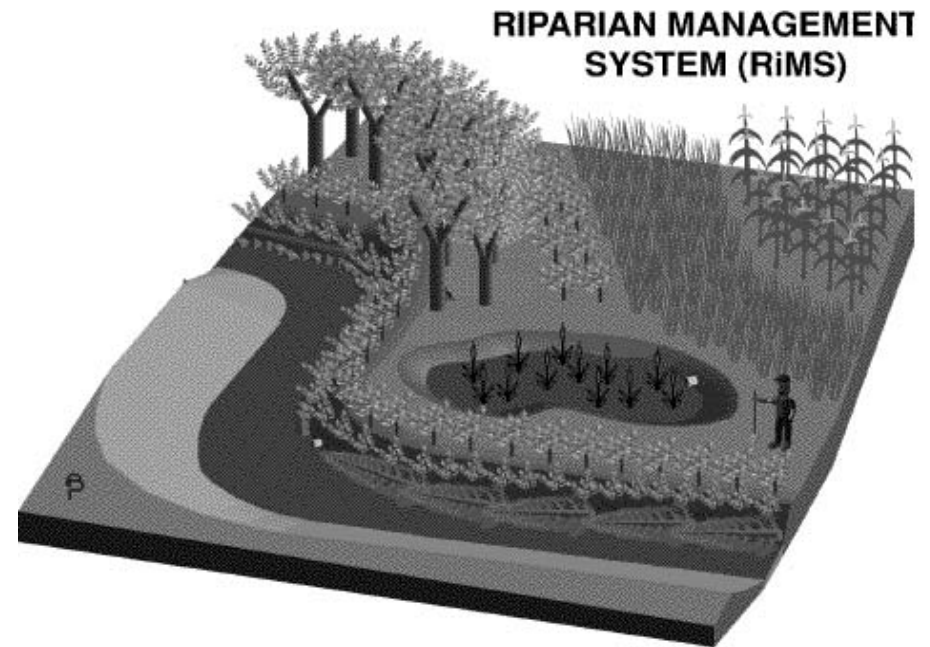
- Intercepts sediment, nutrients, pesticides and other materials in surface runoff
- Reduces nutrients and other pollutants in shallow sub-surface water flow
- Provides food and cover for wildlife including beneficial insects
- Lowers water temperatures by shading
- Slows out-of-bank flood flows

Benefits and Functions - con't ...

- Provides litter fall and large woody debris needed by aquatic organisms
- Tree and shrub roots increase bank and shoreline stability
- Diversifies farm enterprise - timber, wood fiber, horticultural products
- Improves aesthetics, land values, reduces taxes in some locales

DEFINITIONS

Buffer Strip - "An area of vegetation adjacent to a water body that is managed to maintain the integrity of stream channels and shorelines; they also reduce the impact of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals."









Riparian Forest Buffer

Conservation Practice Job Sheet

391

Natural Resources Conservation Service (NRCS)

April 1997

Landowner _____



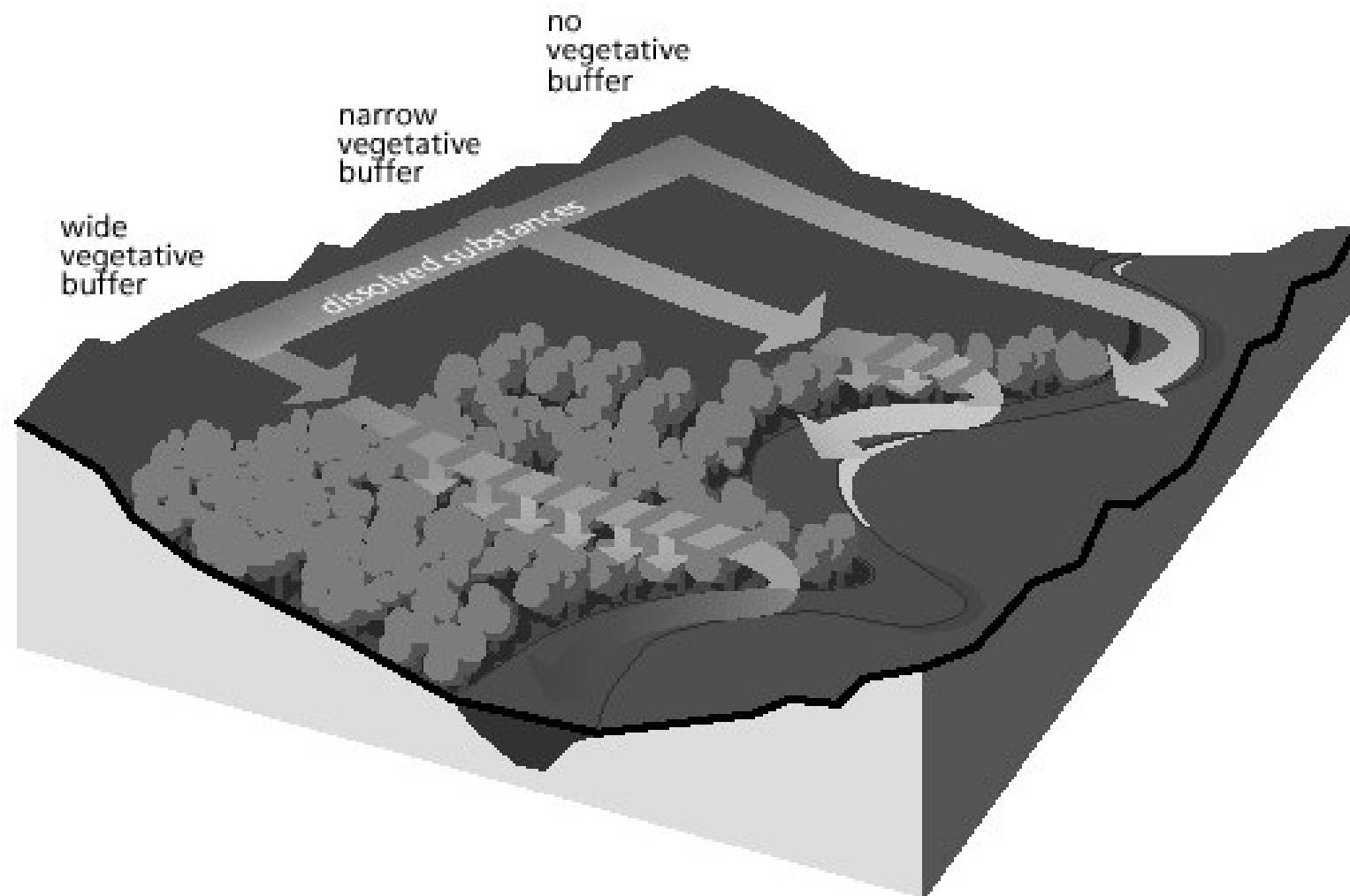


Figure 2.40: *The width of the vegetation buffer influences filter and barrier functions. Dissolved substances, such as nitrogen, phosphorus, and other nutrients, entering a vegetated stream corridor are restricted from entering the channel by friction, root absorption, clay, and soil organic matter.*

Adapted from Ecology of Greenways: Design and Function of Linear Conservation Areas. Edited by Smith and Hellmund. © University of Minnesota Press 1993.



*Buffers protect your land and
visually demonstrate your commitment
to conservation.*

National Conservation Buffer Initiative

Purpose: To encourage the use of conservation buffer strips by agricultural producers and other landowners-- in both urban and rural settings

Goal: To install 2 million miles (up to 7 million acres) of conservation buffer strips by the year 2002



CONSERVATION BUFFERS WORK...
ECONOMICALLY AND
ENVIRONMENTALLY



Watershed Act 1912 Revised September 2002









Corps of Engineers' Ecosystem Restoration Opportunities

Army Corps of Engineers' Ecosystem Restoration Authority

ER 1105-2-100

Corps Planning Guidance

22 April 2000

“Ecosystem Restoration is one of the primary missions of the Corps of Engineers Civil Works program. The Corps objective in ecosystem restoration is to contribute to national ecosystem restoration.”

“Those restoration opportunities that are associated with wetlands, riparian and other floodplain and aquatic systems are most appropriate for Corps involvement.”



Water Resources Development Acts

- ◆ Authorize the Secretary of the Army to study and/or implement various projects and programs for improvements to rivers and harbors of the United States.



Corps Study Authorities To Support Ecosystem Restoration

- ◆ Continuing Authorities Program (CAP)
 - ◆ Section 1135 Ecosystem Restoration
 - ◆ Section 206 Aquatic Ecosystem Restoration
- ◆ General Investigations (GI)
 - ◆ Projects Authorized By Congress Through Passage of Resolution or Act



Objective of the Section 1135 Program

- ♦ The Objective of the Section 1135 Program is to restore structure, function, or dynamic processes of degraded ecosystems.

The focus in ecosystem restoration is on those ecological resources and processes that are directly associated or directly dependent upon the hydrologic regime of the ecosystem and watershed.



Criteria for Qualification as a Section 1135 Project

- ◆ The habitat restoration must be linked to a Corps of Engineers built project.
- ◆ Budgetary priority given where Corps projects contributed to the degradation of the ecosystem
- ◆ The restoration benefits must outweigh the project costs and be associated with fish and wildlife resources.



The Section 206 Program Aquatic Ecosystem Restoration

- ◆ Study Funding Level and Processes
Identical to Section 1135 Program
- ◆ Is Not Restricted to Impacts Resulting from
Corps Projects



General Investigation (GI) Studies

- ◆ GI Studies are Typically Watershed in Scale and are Initiated Where the Public Perceives a Problem and Seeks Congressional Assistance
- ◆ The Study Gains Congressional Approval and Funding
 - ◆ Senate Committee on Environment and Public Works
 - ◆ House Committee on Transportation and Infrastructure
- ◆ Congress Passes Resolution and/or Act
- ◆ Corps Receives Funds To Initiate a Study



A black and white photograph of a dense forest. A path or clearing leads from the foreground towards a bright light source, possibly the sun, which creates a strong lens flare effect. The trees are tall and thin, with a thick canopy of leaves. The ground is covered in low-lying vegetation and fallen leaves.

Bottomland Hardwood and Riparian Corridor Restorations

Ray Roberts Greenbelt

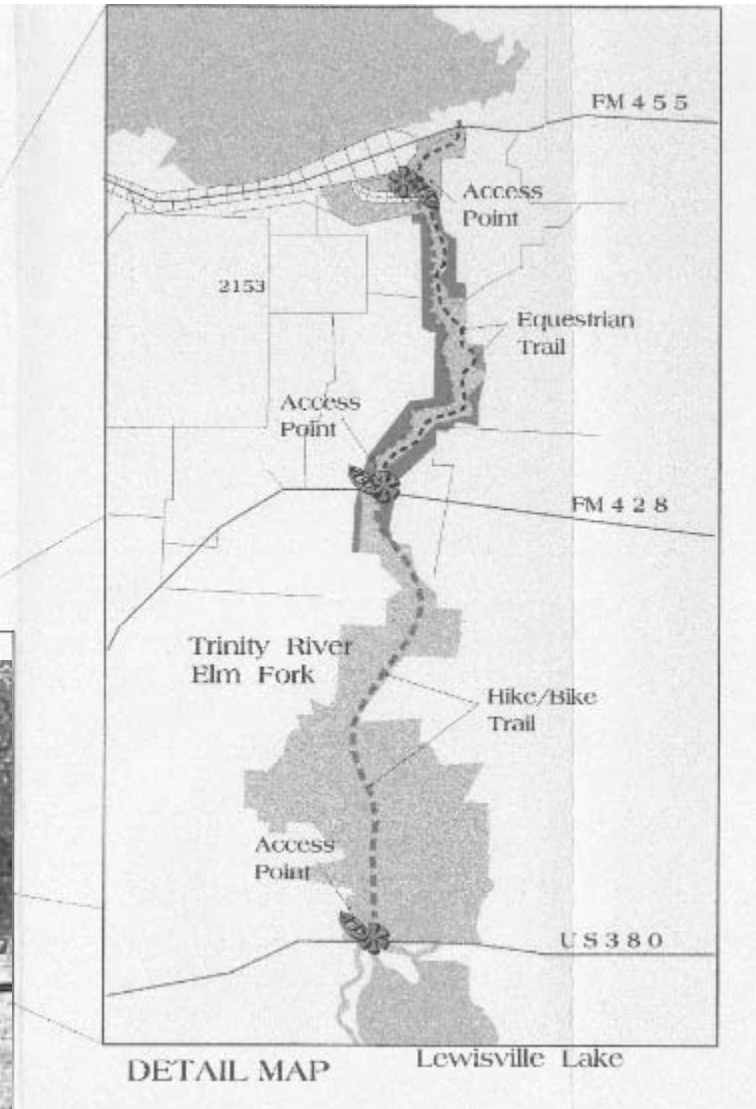
Denton County, Texas



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E-35

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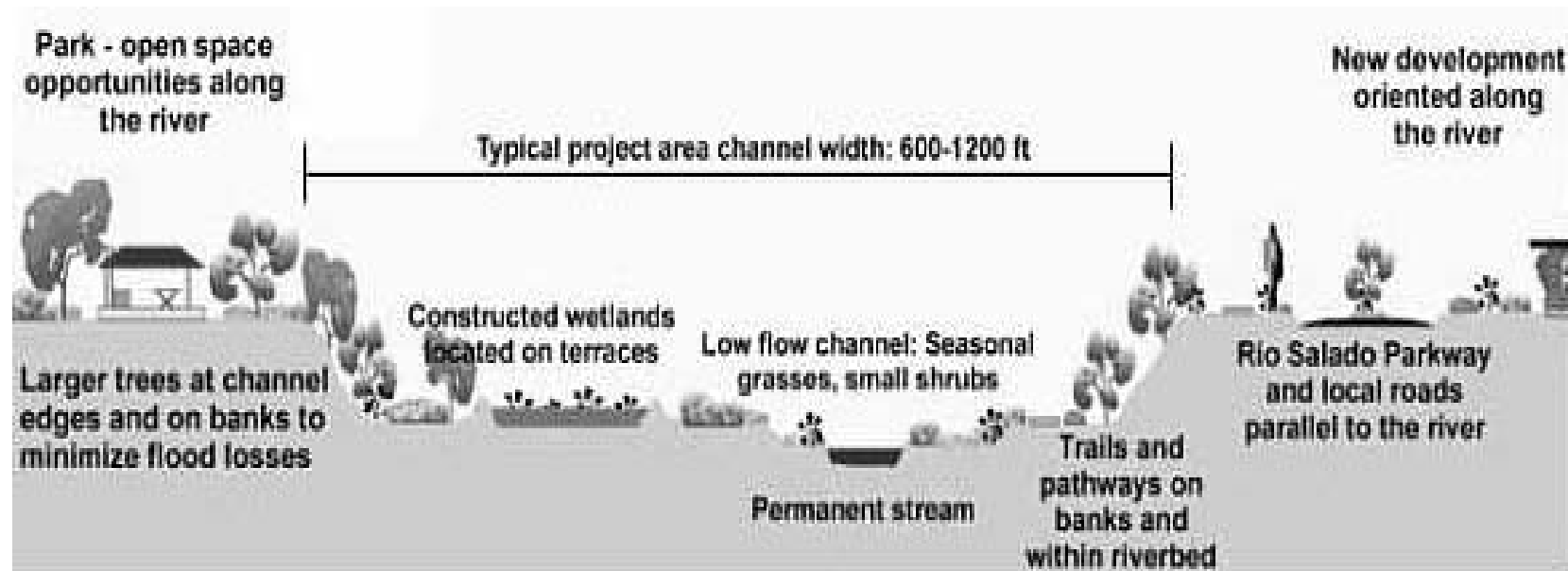


Stream Restoration





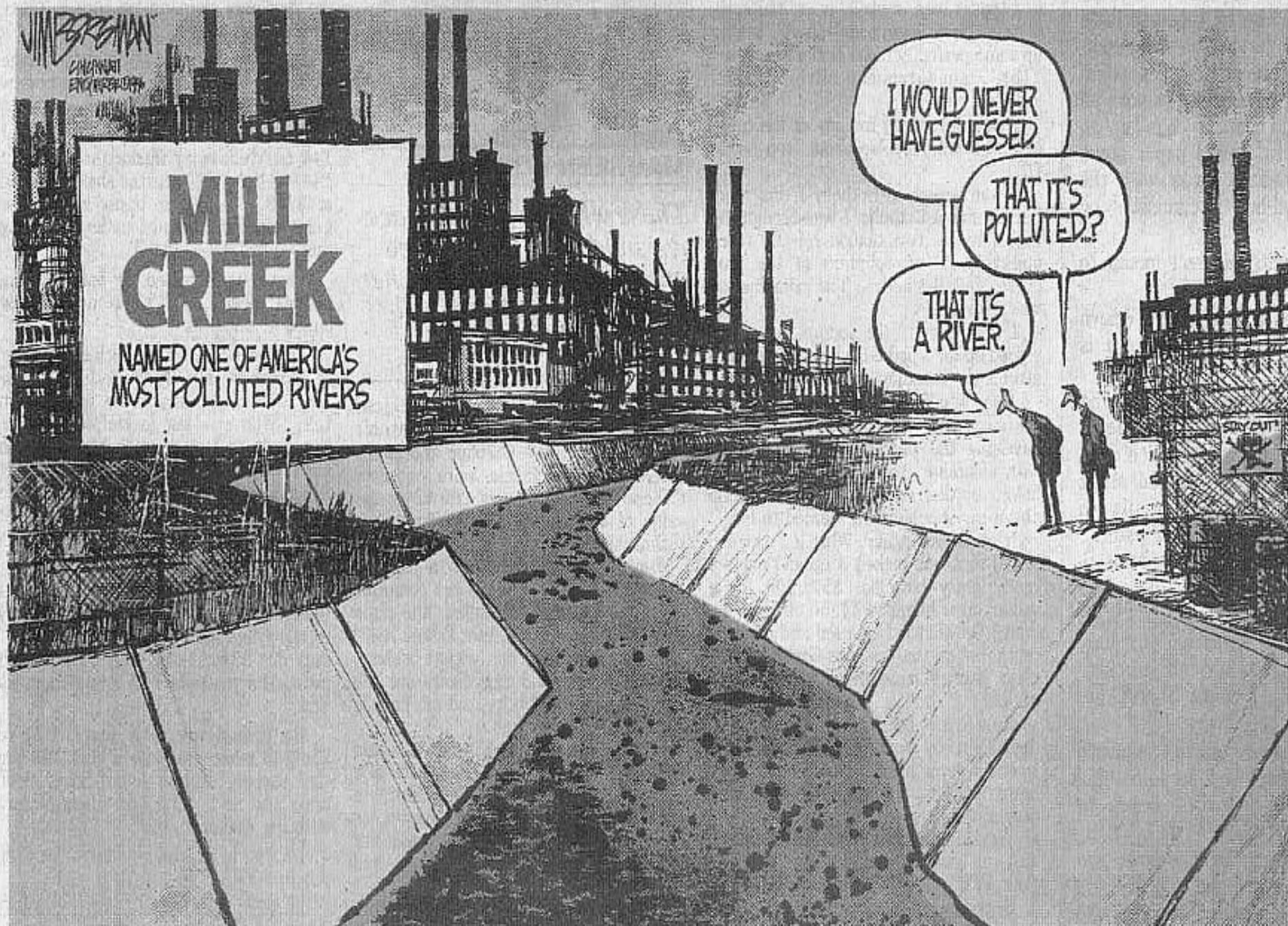
Rio Salado - (Salt River) Riparian Restoration Project





Mill Creek, OH

BORGMAN'S WORLD





Mill Creek, OH



Regulatory Issues

Riparian Definitions

Regulatory Program of the US Army Corps of Engineers Part 330 - Nationwide Permit Program

" Vegetated buffer - A vegetated upland or wetland area next to rivers, streams, lakes, or other open waters which separates the open water from developed areas, including agricultural land. Vegetated buffers provide a variety of aquatic habitat functions and values (e.g., aquatic habitat for fish and other aquatic organisms, moderation of water temperature changes, and detritus for aquatic food webs) and help improve or maintain local water quality. A vegetated buffer can be established by maintaining an existing vegetated area or planting native trees, shrubs, and herbaceous plants on land next to open waters. Mowed lawns are not considered vegetated buffers because they provide little or no aquatic habitat functions and values. The establishment and maintenance of vegetated buffers is a method of compensatory mitigation that can be used in conjunction with the restoration, creation, enhancement, or preservation of aquatic habitats to ensure that activities authorized by NWP's result in minimal adverse effects to the aquatic environment."

Regulatory Program of the US Army Corps of Engineers

Since passage and subsequent amendments to the Clean Water Act, the Corps has had legal authority during Section 404 permit decisions to require vegetated buffer strips as part of the mitigation for filling wetlands. Both upland and riparian vegetated buffer strips can be mandated, in certain situations, by District Engineers as part of a Section 404 permit under the NWP system.

Vegetated buffer strips, such as forested riparian areas, are well-suited for protecting water quality and providing wildlife habitat, and “are a critical element of the overall aquatic ecosystem in virtually all watersheds” (Federal Reg. 67(10), p. 2064).

The Corps has also “believes we need to protect open waters better than we have in the past, and vegetated buffers are a critical element of that protection.”

The Corps “believes that establishing or maintaining existing vegetated buffers to open waters is critical to overall protection of the nation’s

- 225 acres on mainland, 20 acre island, and 170 acres of wetland/open water
- \$750 million development

Humbug Marsh, MI







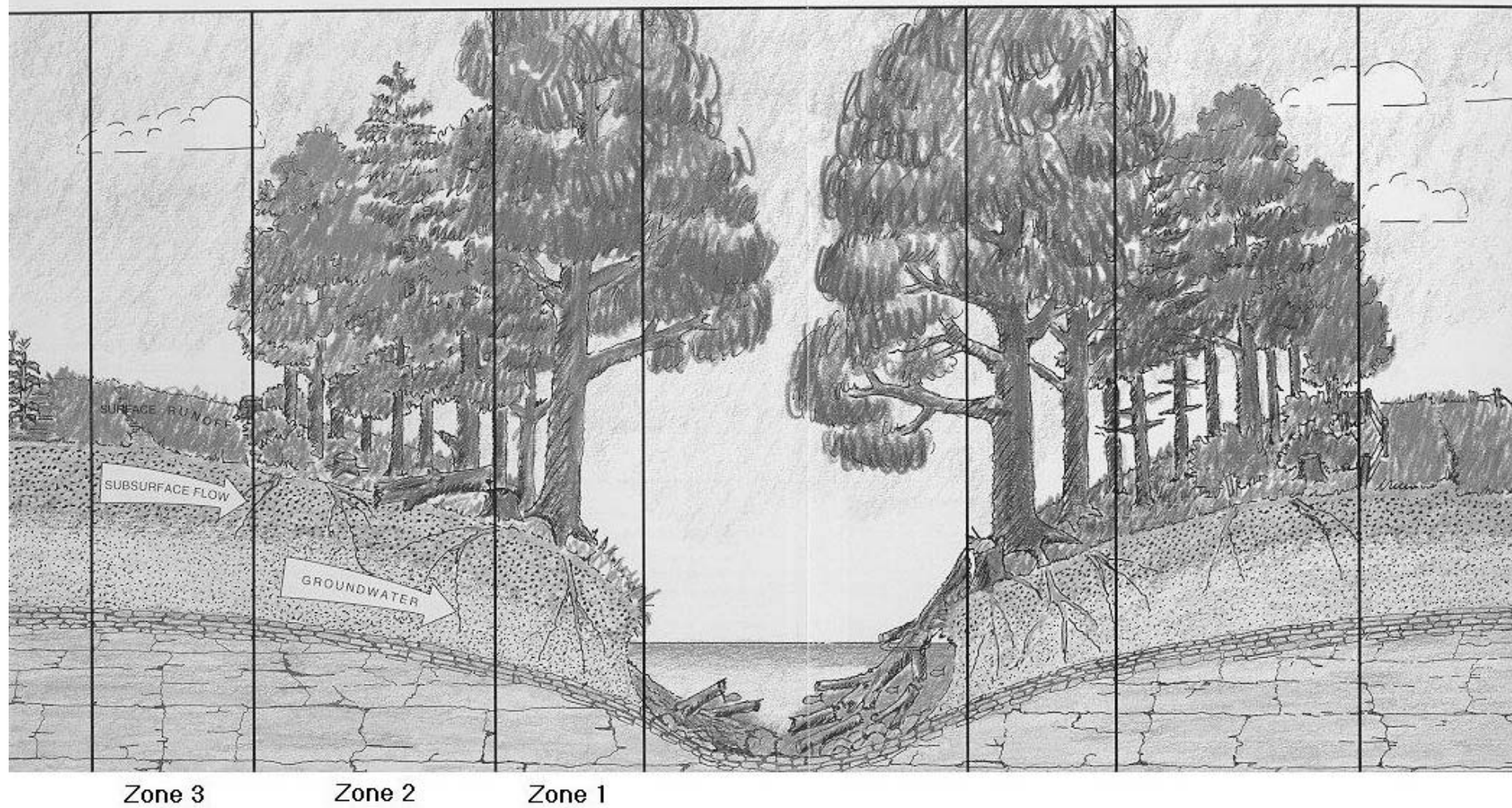








THE STREAMSIDE FOREST BUFFER





Riparian zones provide migration corridors for birds and many large mammals that use different summer and winter ranges.





Products



ERDC/EL TN-EMRRP-SR-08
January 2008

Width of Riparian Zones for Birds

BACKGROUND. Over the past several decades, more than 450 Corps of Engineers Civil Works reservoir projects have been constructed in 43 states encompassing nearly 12 million acres (at normal pool elevations, about one half is water and the remaining half is associated land). The majority of inland Civil Works projects are constructed along streams and rivers. There is increasing interest in managing the riparian buffer strips (i.e., vegetation adjacent to streams, rivers, and lakes) along these watercourses. Retaining riparian vegetation of proper width not only minimizes the impacts of erosion and nonpoint-source pollution, these areas also provide habitat and movement corridors for wildlife as well as benefits to fish populations (Fischer et al. 1999) (Figure 1). Unfortunately, when decisions are made to restore or manage buffer strips adjacent to streams and rivers, the basis for determining strip width has been almost completely dominated by water quality considerations. Few studies have addressed the compatibility of riparian buffer strip widths with other important ecological functions, especially their ability to provide habitat and movement corridors for native faunal and floral species.



Figure 1. Riparian buffer strips provide habitat for plants and movement corridors for a variety of wildlife.

Many riparian zones in North America are degraded to the point that they do not provide the resources needed to make them suitable as habitat or as movement corridors. This degradation also negatively affects many of the other important functions and values these zones provide. Providing bird habitat often is a management objective as Corps lands of riparian zones is a viable option. However, there is little guidance available on the management of riparian zones for birds.

IMPORTANCE TO AVIAN COMMUNITIES

About half of the approximately 720 birds that breed in North America are non-migratory (Figure 2), those that breed in North America but migrate south to the Caribbean, Mexico, and Central and South America. The remaining resident birds (non-migratory) or short-distance migrants (typically breed in the States and Canada and winter in the southern United States). Information from across the nation indicates that many bird species are declining, especially the migratory species.



Riparian Corridors and vegetated buffer zones: Guidelines for Corps of Engineers projects

by A. Fischer and Chester G. Martin, U.S. Army Engineer Waterways Experiment Station

actively manage natural resources (wetlands), it is often necessary to protect riparian buffer zones to protect riparian corridors from land use activities that degrade them. Riparian corridors are the link between riparian buffer zones and the aquatic ecosystem. Riparian corridors are the link between riparian buffer zones and the aquatic ecosystem.



Riparian Terminology: Confusion and Clarification

by Richard A. Fischer,¹ Chester G. Martin,² John T. Ratti,³ and John Guidice⁴

January 2008

INTRODUCTION

Riparian zones occur throughout the United States as long strips of vegetation adjacent to streams, rivers, lakes, reservoirs, and other inland aquatic systems that affect or are affected by the presence of water. This vegetation contributes to unique ecosystems that perform a large variety of ecological functions. Unfortunately, considerable variation is associated with riparian terminology, similar to problems associated with wetlands terminology (Mitsch and Gosselink 1993). This can lead to confusion when people attempt to communicate about riparian zones, particularly if they come from different disciplinary backgrounds. The goals of this paper are to promote awareness of this problem by describing variation associated with semantics in riparian terminology, to explain why this contributes to confusion, to show the importance of attempting to standardize this terminology, and to suggest ways that natural resources professionals can better describe what comprises a riparian ecosystem.

WHY IS THERE CONFUSION? No Universally Accepted Riparian Definition

No single well-defined definition appears to meet or satisfy the needs of all scientists or agencies. For example, Cowardin et al. (1979) defined wetlands and deepwater habitats for the National Wetlands Classification System and Inventory (NWCI), whereas the U.S. Army Corps of Engineers uses a different definition under Section 404 of the Clean Water Act to regulate the deposition of dredged and fill material into wetlands. Similarly, there is no universally

recognized or widely accepted definition that adequately describes all riparian zones (Anderson 1997). Riparian definitions in some books are over-simplified, and books on wildlife habitats and plant communities do not adequately define riparian communities from upland communities (Chimarr and Anderson 1993).

Riparian definitions range from simple descriptions, such as "associated with water courses" (Dick-Peterson and Hubert 1977:56), to technical and detailed descriptions for specific areas (e.g., Mitsch et al. 1993). Recently, Shattell et al. (2000, p. 28) argued more functional definition for riparian zones. They suggested that riparian zones are, "a dimensional expanse of interaction that on the wetland and aquatic ecosystems, that extend down into the groundwater, up above the canopy, outward across the floodplain, up near-slopes that drain to the water, lateral the terrestrial ecosystem, and along the course at a variable width." However, there is no indication that this or other recent definitions will become universally accepted as the standard.

Regional Differences

Stream and river ecosystems differ regionally and locally in many characteristics, including width, depth, frequency of flooding, hydrogeomorphic factors, and vegetation. These differences are most apparent between Eastern and Western regions of the United States. Riparian zones in the east and west often occur on low-order streams having extreme and variable flood conditions (Mitsch and

Design Recommendations for Riparian Corridors and Vegetated Buffer Strips



by Richard A. Fischer¹ and J. Craig Fischer²

April 2000

Complexity	Value as a Planning Tool	Cost
Low Medium High	Low Medium High	Low Medium High

INTRODUCTION

Riparian zones occur as transitional areas between aquatic and upland terrestrial habitats. Although not always well-defined (Fischer et al. 2000), they generally can be described as long, linear strips of vegetation adjacent to streams, rivers, lakes, reservoirs, and other inland aquatic systems that affect or are affected by the presence of water. Riparian zones typically comprise a small percentage of the landscape, often less than 1 percent, yet they frequently harbor a disproportionately high number of wildlife species and perform a disparate number of ecological functions when compared to most upland habitats. Riparian zones have been widely recognized as functionally unique and dynamic ecosystems only within the past 25 years. Even more recently, these areas have become a major focus in the restoration and management of landscapes (Knopf et al. 1988, Naiman, Décamps, and Pollock 1993).

Unfortunately, many riparian zones in North America do not function properly (e.g., they are degraded to the point that they do not protect water quality or provide the resources needed to make them suitable as wildlife habitat or as



Figure 1. Characteristics of vegetated riparian buffer strips influence water quality, wildlife, and recreational opportunities. (photo courtesy of the U.S. Army Corps of Engineers).

movement corridors). This degradation also negatively affects many of the other important functions and values these landscape features provide.

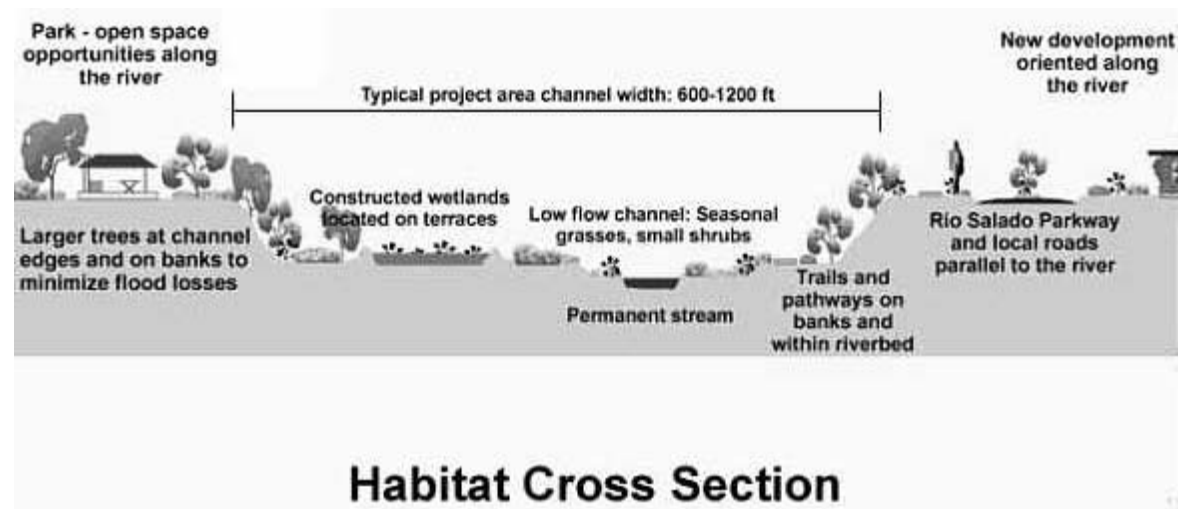
WHAT IS THE DIFFERENCE BETWEEN BUFFER STRIPS AND CORRIDORS?

There is considerable confusion in the literature regarding both wetlands and riparian zones (Fischer et al. 2000). At the heart of this confusion is the proper distinction between vegetated buffer strips and corridors. Riparian zones are most commonly referred to as vegetated buffer strips (e.g., riparian buffer

¹ U.S. Army Engineer Research and Development Center, Environmental Laboratory, 3800 Halls Ferry Rd., Vicksburg, MS 39180

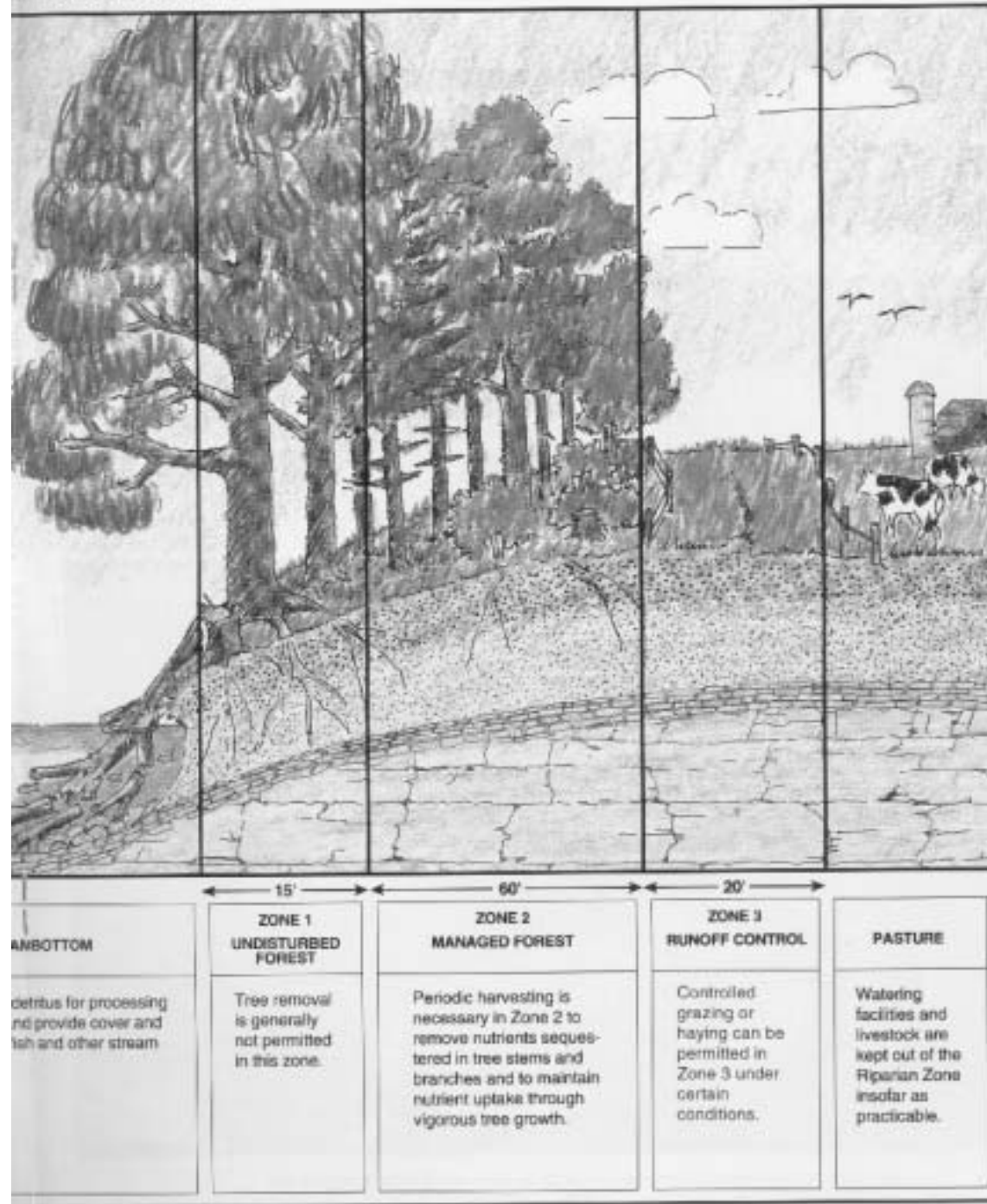
² 1988 Research and Development Center, Environmental Laboratory, 3800 Halls Ferry Rd., Vicksburg, MS 39180
³ University of Idaho, College of Forestry, Wildlife and Range Sciences, Moscow, ID

Riparian Zone Management



How Do I Design a Riparian Buffer Strip or Corridor?

E FOREST BUFFER



**How Wide Should my Buffer
Strip or Corridor Be?**



Riparian Zone Widths Recommended for Water Quality Concerns

Objective	Width (m)
Reducing P Concentrations	15m
Remove 80% of excess N and P	5 m
Improve quality of stormwater runoff	25 m
Remove sediment	61 m
Remove Nitrates and Phosphorus	18 m
Reducing suspended solids	9 m

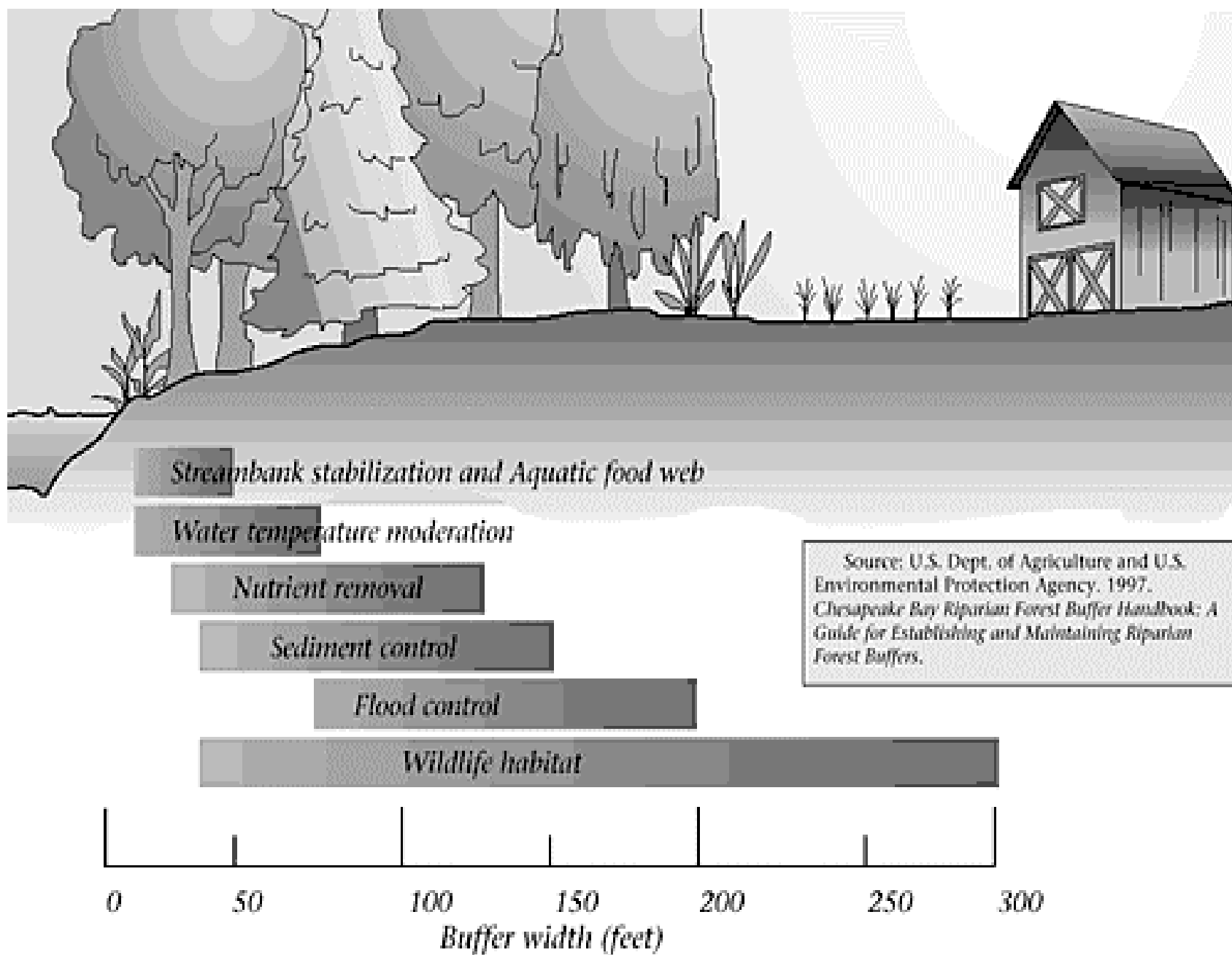
**Note: These are site-specific studies and aren't intended
to be general recommendations**

Riparian Zone Widths Recommended for Bird Communities

Objective	State	Width (m)
Neotropical migrants	VA	50m
Neotropical migrants	KY	100m
Include 90% of bird species	VT	150m
Maintain complete avian community	SC	500m
Maintain functional bird community	GA	100m
Breeding habitat for yellow-billed cuckoo	CA	100m
Reduce edge-related predation	ME	150m
Breeding habitat for area-sensitive species	NH	100m

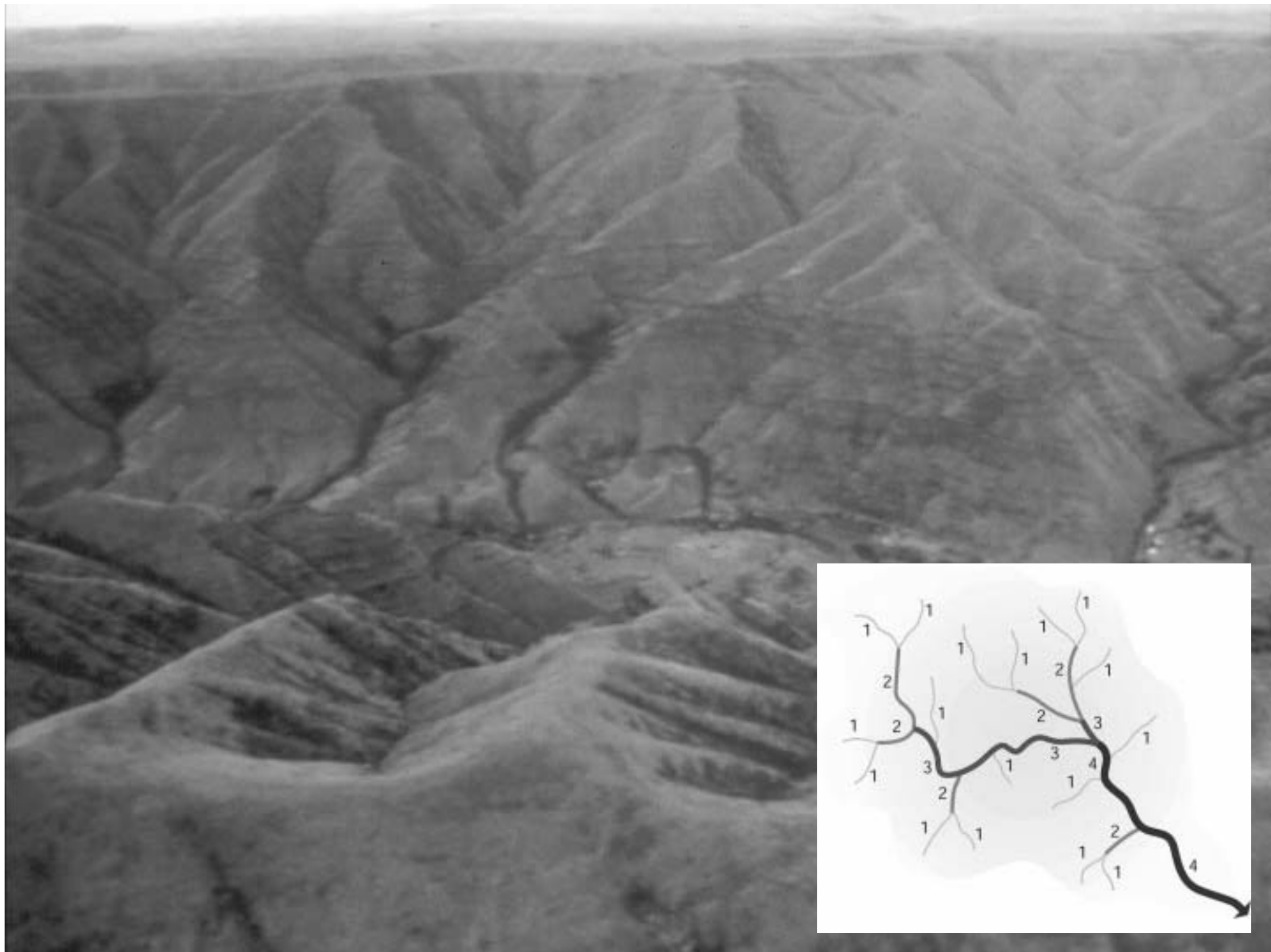
Recommended Widths of Riparian Buffer Zones for Amphibians, Mammals, and Plants

<u>Objective</u>	<u>Width (m)</u>
Support diverse herpetofaunal community	100m
Year-round amphibian habitat	165m
General herpetofaunal habitat	30m
Maintain gray squirrel populations	50m
Include 90% of vascular plant species	30m
Maintain unaltered microclimatic gradient	45m
Maintain benthic invertebrate habitat	30m











NEWS RELEASE

For Immediate Release – July 9, 2002

CONTACTS: Jordan Peavey, The Nature Conservancy, (703) 841-5980, jpeavey@tnc.org <http://www.nature.org>
David Hewitt, US Army Corps of Engineers, (202) 761-0289, david.w.hewitt@hq02.usace.army.mil
<http://www.usace.army.mil>

The Nature Conservancy and U.S. Army Corps of Engineers Announce Partnership to Improve Management of U.S. Rivers



The Conservancy and the Corps have agreed on changes in the management of the Green River Dam in Kentucky. The

WASHINGTON, D.C. –The Nature Conservancy and the Army Corps of Engineers today announced a collaborative effort to improve the management of dams on various rivers across the country.

Under the new partnership, entitled the Sustainable Rivers Project, the two organizations will work together to improve dam operations, helping to restore and protect the health of rivers and surrounding natural areas while continuing to meet human needs for services such as flood control and power generation. The partnership is one that both organizations expect will improve the quality of America's waterways.

Endangered Species Act

- ◆ Riparian areas provide habitat for a large number of threatened and endangered species.
- ◆ Species such as the southwestern willow flycatcher and least Bell's vireo have been major issues on some Corps project lands.



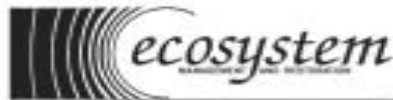
Southwestern
Willow Flycatcher



Federally Endangered
due to large-scale loss
of riparian habitat



Selected Products



Technologies for urban stream restoration and watershed management

by Craig R. Harwood

In recently published proceedings of the 1998 National Conference on Urban Stream Restoration, the authors of this paper present a review of the state-of-the-art in urban stream restoration and watershed management. The paper reviews the current state-of-the-art in urban stream restoration and watershed management, and presents a review of the state-of-the-art in urban stream restoration and watershed management. The paper reviews the current state-of-the-art in urban stream restoration and watershed management, and presents a review of the state-of-the-art in urban stream restoration and watershed management.



Figure 1. Stream restoration project showing a new channel and surrounding vegetation.

Beetle Clusters

by Doug Peterson and Rebecca Sief

Complexity	Environmental Value	Cost
Low	High	Low

INTRODUCTION
Beetle clusters are groups of small trees or shrubs that are planted in a stream bed to provide habitat for aquatic insects. They are planted in a stream bed to provide habitat for aquatic insects. They are planted in a stream bed to provide habitat for aquatic insects.



Figure 1. Beetle clusters in a stream bed.

Design Recommendations for Riparian Corridors and Vegetated Buffer Strips

by Robert A. Fisher and J. Craig Peterson

Complexity	Environmental Value	Cost
Low	High	Low

INTRODUCTION
Riparian corridors are vegetated areas along a stream bed that provide habitat for aquatic insects. They are planted in a stream bed to provide habitat for aquatic insects. They are planted in a stream bed to provide habitat for aquatic insects.



Figure 1. Vegetated buffer strip along a stream bed.

Streambank Habitat Enhancement with Large Woody Debris

by Craig R. Harwood and James V. Brown, Jr.

Complexity	Environmental Value	Cost
Low	High	Low

INTRODUCTION
Streambank habitat enhancement is the process of improving the habitat of a stream bed by planting large woody debris. It is the process of improving the habitat of a stream bed by planting large woody debris. It is the process of improving the habitat of a stream bed by planting large woody debris.



Figure 1. Streambed habitat enhancement with large woody debris.



Width of Riparian Zones for Birds

by Robert A. Fisher and J. Craig Peterson

Complexity	Environmental Value	Cost
Low	High	Low

INTRODUCTION
Riparian zones are vegetated areas along a stream bed that provide habitat for aquatic insects. They are planted in a stream bed to provide habitat for aquatic insects. They are planted in a stream bed to provide habitat for aquatic insects.



Figure 1. Vegetated riparian zone along a stream bed.

Riparian Terminology: Confusion and Clarification

by Robert A. Fisher, J. Craig Peterson, and John T. Noss

Complexity	Environmental Value	Cost
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Figure 1. Vegetated riparian zone along a stream bed.



Corridors and vegetated buffer zones—Guidelines for Corps of Engineers projects

by Robert A. Fisher and J. Craig Peterson

Complexity	Environmental Value	Cost
Low	High	Low

INTRODUCTION
Corridors and vegetated buffer zones are vegetated areas along a stream bed that provide habitat for aquatic insects. They are planted in a stream bed to provide habitat for aquatic insects. They are planted in a stream bed to provide habitat for aquatic insects.



Figure 1. Vegetated buffer zone along a stream bed.



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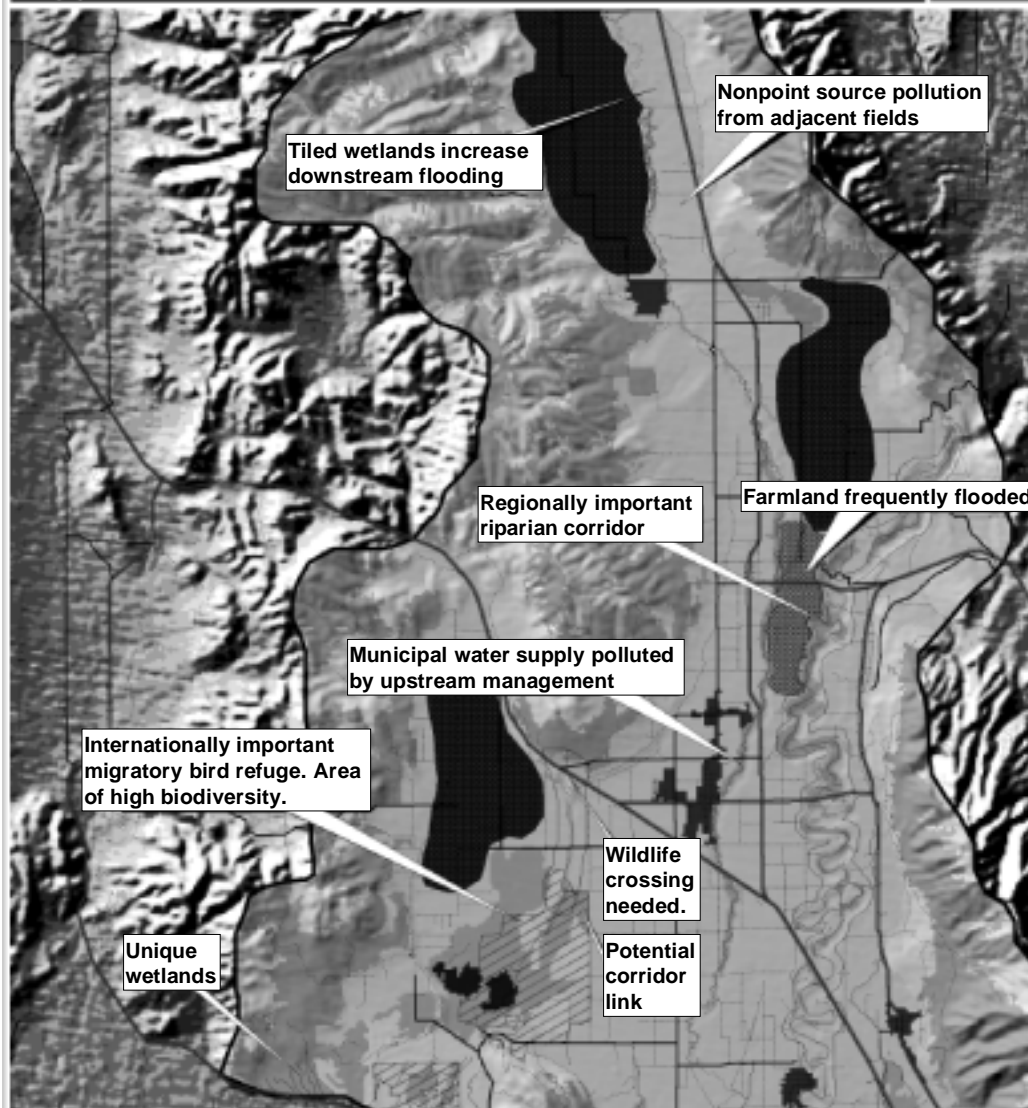
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Problems & Opportunities

Willow Creek Watershed Planning Project
Natural Resources Conservation Service



Basemap Information

- Planning Boundary
- Urban
- Highways
- County Roads
- Streams

Vegetation

- Coniferous
- Deciduous
- Shrub
- Grass
- Riparian/Wetland
- Agriculture

Miscellaneous

- Erodible soils
- Streambank erosion

Notes:

* Refer to report for further information on problems and opportunities in the watershed.

10000 0 10000 20000 30000 Feet

